2012-06

Developing a User-Centered Article Discovery Environment

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Planning and Implementing Resource Discovery Tools in Academic Libraries

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Information Science
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Published in the United States of America by
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: http://www.igi-global.com

Library of Congress Cataloging-in-Publication Data

Planning and implementing resource discovery tools in academic libraries / Mary Pagliero Popp and Diane Dallis, editors.
pages cm
Summary: “This book addresses the many new resource discovery tools and products in existence as well as their potential uses and applications”--Provided by publisher.
Includes bibliographical references and index.
ISBN 978-1-4666-1821-3 (hardcover) -- ISBN 978-1-4666-1822-0 (ebook) (print) -- ISBN 978-1-4666-1823-7 (print & perpetual access) (print) 1. Online library catalogs. 2. Federated searching. 3. Library web sites. 4. Library catalogs and users. 5. Information behavior. 6. Academic libraries--United States--Case studies. 7. Academic libraries--Canada--Case studies. I. Popp, Mary Pagliero, 1949- II. Dallis, Diane, 1971-
Z699.35.C38P58 2012
025.5’24--dc23
2012003667

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

Chapter 12
Developing a User-Centered Article Discovery Environment

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ABSTRACT

This chapter discusses the user-focused research conducted at the University of Michigan Library to help make decisions about selecting and implementing a Web-scale article discovery service. A combination of methods—persona analysis, comparative evaluations, surveys, and guerrilla usability tests—were applied to bring a user-centered approach to the article discovery service decision-making process. After the selection of the Serials Solutions®[1] Summon™[2] service and developing a custom interface to this resource using the Summon™ API, a follow-up user survey was conducted and search log data were analyzed to gauge the impact of the Library's decisions on users' research habits and their perceptions of the library. Users reported a high rate of satisfaction with the new article discovery service and, as a result, reported being more likely to use library online resources again.

INTRODUCTION

The University of Michigan is a Carnegie "Research I" institution with almost 42,000 students in eighteen undergraduate and graduate schools. The University of Michigan University Library is one of the top ten in the world with approximately 8.5 million volumes in its collection. The University Library has long been a leader in digitization and preservation efforts, including being in the original group of partners for the Google Books™[3] scanning project and, later, creating the nucleus of the HathiTrust.

DOI: 10.4018/978-1-4666-1821-3.ch012

Serving such a breadth of content to an extremely diverse group of scholars is one of the library's main challenges, one that was not being met by a loose confederation of departmental and library Web sites maintained by local operations of the University Library in individual schools. Before the redesign effort that culminated in a tightly integrated single Web site in 2009, the library had approximately two dozen largely independent Web sites representing physical library locations and departments across the campus. Where the previous sites had been focused at particular groups of users (from the medical campus, the undergraduate college, the school of music, etc.), the new site was intended to provide a universal starting point for research to all patrons, without them needing to know where to launch their research.

In addition to completely redesigning its Web site using the Drupal open source content management system, the library also implemented VuFind, an open source search engine developed at Villanova University, as the front end to its library catalog.[4] With so much discussion and work on issues of findability and discovery in library systems, it was inevitable that the library's article discovery environment would come under scrutiny. At the time, the library was using Ex Libris's™[5] MetaLib®[6] federated search software, locally branded as "Search Tools Quick Search," for article discovery. There was general dissatisfaction with the service, as expressed through user reports to public service librarians that patrons were turning to Google and Google Scholar™[7] instead. An initial internal discussion about replacing the MetaLib® federated search service with Google Scholar™ was refocused when commercial Web-scale discovery products first became available on the market in 2009.

The idea of "Web-scale discovery" has been a hot topic in libraries ever since Marshall Breeding (2005), reacting to the debut of the Google Scholar™ search engine in November 2004, suggested that libraries should pursue a "centralized search" approach "on the scale of the Web" (pp. 27-28) to develop new discovery tools for library-provided electronic resources—a single, comprehensive, large-scale index for all the journals, newspaper articles, and other content the library makes available online. Would such a tool meet the needs of users better than free Web search engines like Google Scholar™? Could one of these new products provide the desired article discovery capability? To answer these questions, library administration charged the Article Discovery Working Group (ADWG) with investigating the tools and services then available.

This group decided to bring a user-centered approach to the article discovery service decision-making process.[8] It conducted its research in three phases. During the investigation phase, the group set out to determine what students and faculty expected from an article discovery tool. Given these expectations, the group evaluated and sought feedback on a proposed selection. To do this, personas were developed to create archetypical users against whose hypothetical expectations real-world tools could be evaluated. Using these personas, the group conducted a comparative evaluation of discovery tools, a survey of the user community, and undertook a "guerrilla" usability evaluation of the leading tool. During the implementation phase, a satisfaction and usability survey accompanied the launch of the new tool based on the Summon™ service from Serials Solutions®. And finally, during the post-implementation phase, the library validated its decision by conducting a follow-up survey and usage statistic analysis to measure change in use and evaluate whether or not users' expectations were being met.

BACKGROUND

Potential library users do not often think of the library as the starting point for research. A 2010 survey by the OCLC Online Computer Library Center asked information consumers where they were

most likely to start their search for information. Eighty-four percent of all users, and eighty-three percent of college students, reported beginning their search with an Internet search engine. Not a single survey respondent reported beginning their search on a library web site (De Rosa et al., 2011). Even among faculty, the library as a starting point for research has shown a decline since the advent of Internet search engines. A series of large-scale surveys of faculty conducted by Ithaka S+R has shown a decrease in the number of faculty who report using either the physical library building or the online library catalog as their starting point for research. Instead, they are increasingly turning to "network-level" electronic resources, including general purpose search engines (Schonfeld & Housewright, 2010).

Selection and Use of Discovery Systems

The rise of discovery tools such as Google Scholar™, Summon™, EBSCO Discovery Service™, Primo® Central, and others, has led to some research into the effects of these new tools on users and libraries. The University of Nevada, Las Vegas described their selection process, deeply focused on library staff needs and vendors (Vaughn, 2011). OCLC published a detailed report on librarian needs in a catalog which explored the specific needs of librarians. The report found, in part, that "the end user's experience of the delivery of wanted items is as important, if not more important, than his or her discovery experience" (Calhoun et al., 2009, p. 7). This finding—that the ends can justify (or at least excuse) the means—is a common thread across discovery platforms, whether defined broadly (all library resources) or narrowly ("just" the catalog or full-text online materials).

Published studies on the effects of having implemented a discovery environment have focused on seemingly more easily measured features such as full-text downloads and searches. An early study at Grand Valley State University focuses on the use of library resources in the year after that library launched Summon™. Way (2010) found that Summon™ was "increasing access to the library's resources" (p. 219). Another study at the Edith Cowan University Library in Perth, Australia focused on the user's understanding of the quality of the results returned from that library's Summon™ implementation (Gross & Sheridan, 2011).

User-Centered Research Methods

Given the fast pace of software development, it has become increasingly important to employ user-centered research methods that are streamlined in order to devote more time and resources to design, implementation, and iteration. Techniques such as personas, guerrilla usability testing, and unmoderated usability testing surveys are tools that require fewer resources, in both time and money, than formal usability testing.

The concept of personas was chiefly popularized by Cooper (1999) as simply "a precise description of our user and what he wishes to accomplish" (p. 123). Despite the fact that personas are a relatively new user-centered design technique, it is now a well-established method for "providing an emotional bridge between team members and end users" (Guenther, 2006, p. 50). Within the last few years, libraries have begun using personas to support interface design and development as well as strategic decision-making. The University of Colorado at Boulder Libraries employed personas to help understand the needs and goals of institutional repository users (Maness, Miaskiewicz, & Sumner, 2008); the Johns Hopkins University Libraries employed them to guide a discovery tool selection (Uzelac, Conaway, & Palmer, 2008); the University of Washington Libraries, to support their Web site design (U. W. Libraries, n.d.); the University of Minnesota Libraries, "to reflect the diversity of the Libraries' user communities" (Hanson, et al., 2011, p. 5); the

Cornell University Library, to determine how the library should "present itself and the information landscape to its users" (Koltay & Tancheva, 2010, p. 173); and the HathiTrust, to help developers, policy makers, user experience designers and researchers, and reference and instruction librarians "learn more about HathiTrust users, discover how we can better suit their needs, and identify areas in which to do more in-depth research" (Mishra, 2011, p. 2).

Guerrilla usability testing plays a vital role in the streamlined development process by providing a way to engage users and get quick and immediate feedback. Although not as thorough as formal usability tests, guerrilla tests still provide insight about potentially serious problems that may not be obvious to the developers. The North Carolina State University Libraries employed guerrilla testing with success to determine whether a tabbed search box effectively conveyed their search options (Teague-Rector, Ballard, & Pauley, 2011), and the University of Michigan University Library uses the method extensively to test interface labels, functionality, and design.[9] Additionally, unmoderated usability testing mechanisms have emerged in the last few years to combine the ease of a survey with the ability to track users' success at accomplishing certain tasks. This technique is "uniquely suited for collecting qualitative and quantitative data about attitudes and behaviors" (Albert, Tullis, & Tedesco, 2010, p. 5). However, unlike guerrilla usability, unmoderated testing does not involve any direct contact or conversation with the users, but does put the user in the context of the task via interactions with the live Web site or static images (Bolt & Tulathimutte, 2010).

INVESTIGATION

Persona Analysis

The first stage of the Article Discovery Working Group's (ADWG) research into user expectations was the development of personas to help model the needs and expectations of potential users of article discovery tools. The personas that were developed for this study were based significantly on work done at other institutions, particularly Johns Hopkins University (Uzelac, et al., 2008; Uzelac, 2009). The Johns Hopkins University user study was done to create data-driven personas to guide their own discovery tool selection and implementation. Interviews with seventy-eight Johns Hopkins University affiliates were completed in the spring of 2008; this group of users was reduced to six personas: the Data Cruncher, the Guide, the Browser, the Simplicity Seeker, the Complex Searcher, and the Advice Seeker (Uzelac, et al., 2008).

For the ADWG's work these personas were slightly adapted to fit particular types of users on the University of Michigan's Ann Arbor campus. After analyzing the data and grouping common behaviors, goals, and context of interviewees, the research team redefined the Johns Hopkins personas as follows:

Joan, Staff Researcher in the Applied Physics Lab
Donald, Associate Professor in the Business School
Candace, Graduate Student in Musicology
Ryan, Undergraduate Student in Political Science
Anthony, Professor in Biomedical Engineering
Asha, Undergraduate Student in English

It is important to note that even though the personas are distributed amongst academic demographics, a persona does not represent that demographic. Rather, a persona represents common goals, needs and behavior patterns that can be found across demographics. For example, Asha does not represent all undergraduate students in the humanities, although "her" needs and expectations typify many of those students.

The next step was to model how each of these personas might approach article-level research. The regular discovery tasks that they were per-

forming, the goals and attitudes driving these tasks, and the requirements of a discovery tool that would support these goals and tasks were all described. These goals and needs were grouped together with those expressed by other personas. Thus, the common goals and needs were identified, including:

Use the most relevant and useful content
Save time
Ensure use of quality content from reputable sources
Use reliable, trustworthy and familiar sources

Different personas often expressed different needs to fulfill a common goal. For example, to find and use the most relevant and useful articles, Joan needs recommendations and reviews from colleagues and other scientists; whereas Anthony needs advanced search features such as limiters, filters, fielded searching and classification schema. Understanding the various needs of different users in accomplishing similar goals laid the foundation for the group to make data-driven decisions on what features to consider in comparing discovery tools.

Comparative Evaluation

The persona analysis led to the development of a set of features that individuals who are seeking articles through a library tool would find important. This feature set was used as the scorecard against which three different article discovery tools were measured: the University of Michigan University Library's existing implementation of Ex Libris's™ MetaLib® federated search engine; the Google Scholar™ search engine; and Serials Solutions® Summon™ service. (Summon™ was selected at this stage because it was the only fully operational library Web-scale discovery service available at the time of the investigation.)

To increase the evaluative utility of the user personas, the group distilled the goals implicit in the personas into a list of concrete features and tasks that could serve as a basis for the comparison and evaluation of the article discovery tools. This process generated a list of forty-four features and tasks, which became the criteria used to evaluate the individual tools (see Table 1, Table 2, and Table 3). To start the evaluation process, each group member formulated and ran identical searches in the tools to determine whether the features were present and the tasks could be completed. The resulting data was compiled in a lengthy spreadsheet with a row for each criterion and a column for each tool. Features were grouped into conceptual families to put similar and related functionalities together. When there were disagreements among members of the group about how to interpret the available data, the group discussed the relative strengths and weaknesses of a feature until a consensus was reached.

The completion of this process resulted in a list of features desired by users and a summary of which tools could meet the priorities. The conclusion from this analysis indicated that Summon™ would be the best choice to meet most user needs. However, before the group formally recommended that the library take on a significant investment of resources, it was decided to validate that conclusion with further testing.

Preliminary Survey

The next step was to conduct a campus survey to ask the community which of the features that varied significantly among the three identified alternatives they felt were the most important in an article discovery environment. The survey was distributed via links on the library home page and email sent to faculty and graduate students by subject specialist librarians. The survey ran for approximately ten days in Fall 2009 and received a total 974 responses from graduate students (50%), faculty or staff (30%), undergraduates (18%), other university-affiliated persons (1%), and unaffiliated persons (<1%).

Table 1. Comparison of Summon™, MetaLib®, and Google Scholar™ by persona-generated functionality

Functionality	Description	Evaluation
Scholarly Results		
Top databases & journals for subject areas are included	What is the coverage of the tool compared to the library's total online holdings?	Summon™, MetaLib yes; Google Scholar unclear
Quantify or compare number of scholarly sources obtained with the same search	Of the library's peer-reviewed / scholarly journal content, what portion is included?	Quantity OK; quality hard to judge or limit to (can limit to 'scholarly' in some cases in all three tools)
Peer-reviewed articles filter	Can search results be limited (before or after the search) to only peer-reviewed materials?	Summon™
Is the tool biased toward certain fields or not good for other fields?	Is the content in the service focused on humanities, social sciences, or sciences, to the detriment of the other categories?	No difference
Communicate Research		
Email results	Can a search result set, or selection therefrom, be emailed to someone?	Summon™
RSS feed for specific search	Are search results available in RSS so that a search alert service could be effected?	Summon™
Text citation(s) to mobile device	Can citations be texted (SMS) to a mobile device?	Easier in Summon™, but not built in
Save results/citation (e.g. to "my shelf")	Is there a way to save items once they are found, for future use?	Summon™ / MetaLib
Export in variety of formats, including RefWorks & EndNote®	Can citations be exported to common bibliographic management tools?	Easier in MetaLib and Summon™
Mobile Technology		
Can be used on high-end mobile device with full browser (ready now, could be done, etc…)	How ready is the system for tablet computers?	Yes for all three
Can be used on low-end mobile device without full browser (ready now, could be done, etc…)	How ready is the system for smart phones?	Google Scholar
Good format and interface for mobile devices	How compatible, overall, with mobile devices?	Google Scholar
iPhone, Palm, Android, etc. app capability: 'I want an app for this'	Is there an "app" version for iPhone/Android phones?	Summon™ will have one
Other Characteristics		
Cost	What range is the subscription cost?	Google Scholar is free; Cost of MetaLib and Summon™ is considerable
Available now	Is it something that could be purchased and turned on today?	All three

The survey asked users to rate the importance of all twelve features on a five-point Likert scale ranging from "Not at all important" to "Very Important." (See Appendix A for the complete survey instrument.) In Figure 1 the results are summarized graphically, with preferences of each user group sorted by the overall average importance rating. The graph reveals general agreement on discovery tool feature preferences between the three major user groups. (For additional survey results, see Bhatnagar, et al., 2010.)

Guerrilla Usability Test

Based on the findings of the persona process and the preliminary survey, there was confidence that Summon™ was the best tool on the market at that time. Before committing the resources to license the product, library administration asked that the actual product be tested with faculty and students. A brief "guerrilla usability test" was conducted, consisting of impromptu interactions with volunteer participants. Guerrilla tests are designed to be brief, narrowly focused sessions with little or no overhead. Library staff went to various library locations (near reference desks

Table 2. Comparison of Summon™, MetaLib®, and Google Scholar™ by persona-generated functionality: technology/customizability

Functionality	Description	Evaluation
Technology/Customizability		
Authentication ability	Can user log in with a campus authentication service and be recognized as a library user?	No difference
Can be integrated into the front page of library/navigation bar	Can the tool be embedded in the library's web site?	Summon™ best, then MetaLib
Full text provided immediately in results—or direct link to PDF of full text with no additional database navigation	To what extent do citations link directly to full text (or do users need to do further searches in a publisher's or aggregator's site?)	All via proxy/citation linker
Can we customize to provide something like "tip of the day" for searching?	Is the user interface customizable for short-term needs?	Summon™ best, then MetaLib
Can results list be made into a static URL?	Can a user bookmark the search results page and get back to the same search again?	Summon™
Static URL for article? (URL in the location bar)	Do individual citations have permanent URLs for sharing or future reference?	No difference
Appealing, intuitive interface	Is the service easy and satisfying to use?	Summon™ best, then Google Scholar
Can we integrate local tagging system?	Can locally developed bookmarking or tagging systems be integrated into the service?	Summon™
Can we integrate tools to indicate "Library Approved" journals/databases?	Is there a way for librarian subject specialists to indicate that certain journals are more authoritative than others?	Summon™
Compare the time each tool takes to do the same exact search	Which service has the fastest response time?	Summon™ and Google Scholar much faster than MetaLib
Provide access to delivery services (links in results/records to request forms)	Can articles not in the University Library's collection be easily requested through the existing document delivery service?	No difference
Easy access to tutorials—either built in help/tutorial or link to library-created guides	Are help pages adequate and easily accessible?	No difference
Meets basic accessibility standards	Is the site accessible to visually impaired users?	No difference

or library entrances), approached passers-by and asked if they had a few minutes to test a potential new service. (See Appendix B for the script used in this test.)

In this manner, a total twenty-four evaluations were conducted with undergraduate students (10), graduate students (5), faculty (5), library staff (2), and other university-affiliated persons (2). The goal of this evaluation was to gain insight into the likelihood that the University community would use the Summon™ product if it were offered. Dartmouth College's Summon™ implementation was selected as the test platform because, although it is a smaller institution than the University of Michigan, Dartmouth provides a similar undergraduate education as well as graduate programs in business, engineering, and medicine. Despite Dartmouth's smaller size, its journal collections are at least similar in breadth to the University of Michigan's.

Participants were asked to conduct a search on a topic with which they were familiar and to peruse the results. They were then asked several questions focused on the quality and comprehensiveness of the results for their purposes and the effectiveness of the interface. The overwhelming majority of participants (20 out of 24), when asked if results were useful, said "yes." Of the remaining responses, two said "maybe" and two said "no." Both of the "no" responses were from researchers at the medical campus who expressed a strong preference for PubMed as their article research tool. One said, "It's useful, but I'm un-

Table 3. Comparison of Summon™, MetaLib®, and Google Scholar™ by persona-generated functionality: facets/information discovery

Functionality	Description	Evaluation
Facets/Information Discovery		
Subject searching & facets	Can searches be narrowed using subject headings or keywords?	Summon™ best, then MetaLib
Suggest related topics/subtopics	Does the system suggest additional subject headings or keywords?	Summon™ best, then MetaLib
Suggest articles related to the one displayed	Does the system provide a "similar to this one" function at the citation level?	No difference
Year of publication facet	Can results be limited by year or range of years?	Summon™ best, then MetaLib
Citation tracing—track articles cited in and cited by	Does "cited by" data appear in search results?	Google Scholar
View an article's citations/notes	Are the references used in an article included in the search results?	Not in native interface for any
Narrow down results based on material type—books, chapters, articles	Can search results be narrowed by kind of item?	Summon™ best, then MetaLib
Limit by availability—physical copies in library or electronic only	Can search results be narrowed to items currently available for checkout or online?	Summon™
Open Access filter	Can results be narrowed to only open access publications?	Not in native interface for any
Search variety of databases at once	Does a single search retrieve results from multiple traditional citation databases?	Yes, but none present 'databases' as coherent whole
Restrict searching to specific database(s) or journal(s), have a facet/filter	Can a search in the system be targeted to one or more traditional citation databases or specific journals?	MetaLib
Variety of search fields (advanced searching option?)—title, author, journal, volume, issue, page number, conference name, etc.	Is there an advanced search capability that permits searching limited to particular metadata fields?	Summon™ best, then MetaLib
Search variety of materials—images, scholarly articles, opinion pieces, newspaper articles, encyclopedias, conference proceedings, patents, etc.	Does the service include a range of content types?	Summon™ best, then MetaLib & Google Scholar
Incorporates web-searching with article searching (non-journal information that's credible; like doing a site:gov or site:edu search in Google, open access journals, government web sites, associations, etc.)	Is there non-article, non-book content?	MetaLib: Not at all Summon™, Google Scholar: Limited
Auto-complete/auto-suggestion search queries (i.e., like Google)	Can the system intuit probable search queries after a certain number of user keystrokes?	No difference
Did you mean (i.e., spell check)	Does the system suggest alternate or correct spellings of words?	Google Scholar does this; Summon™ could

likely to switch from PubMed" (Dennis, Duque, MacEachern, Samuel, & Varnum, 2010, p. 3).

Participants were also asked what other tools they used for article search. Tools mentioned ranged from databases provided by the library (JSTOR®[10], the library catalog, ProQuest®[11], etc.) to freely available resources such as Google Scholar™ and PubMed. The majority of respondents (78%) said that the results they found through Summon™ were better than the results they found using their usual tool. Especially noteworthy was the fact that each of the seven participants who cited Google Scholar™ as a regular starting point for their research felt that Summon™ provided better results. (For additional survey results, see Dennis, et al., 2010.)

IMPLEMENTATION

The results of the guerrilla test convinced library administrators to move forward with Summon™. The University Library then embarked on a rapid, three-month implementation schedule, starting with signing a contract in July 2010 and ending with launching the new service in September 2010.

Figure 1. Discovery tool feature preferences by user group

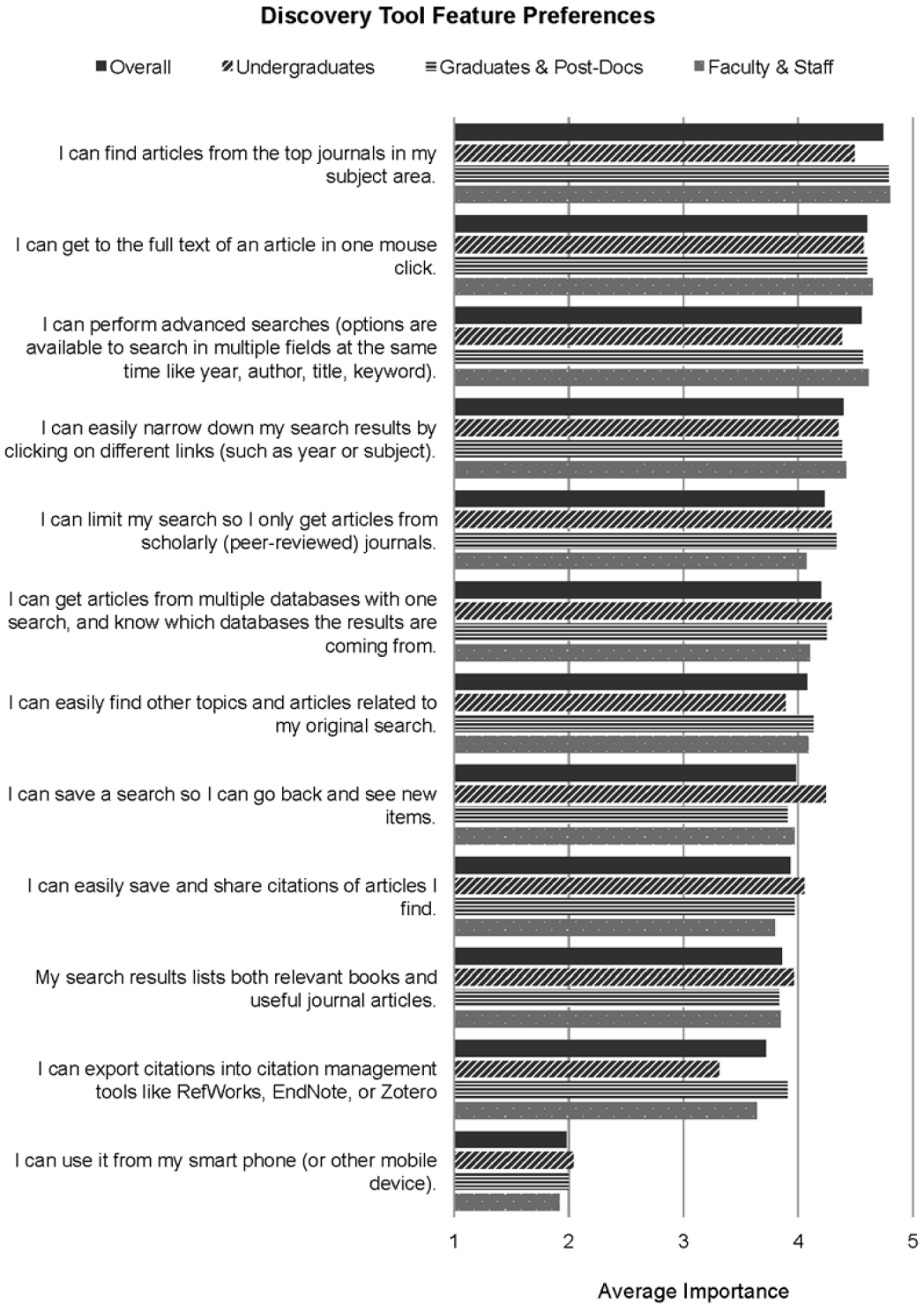
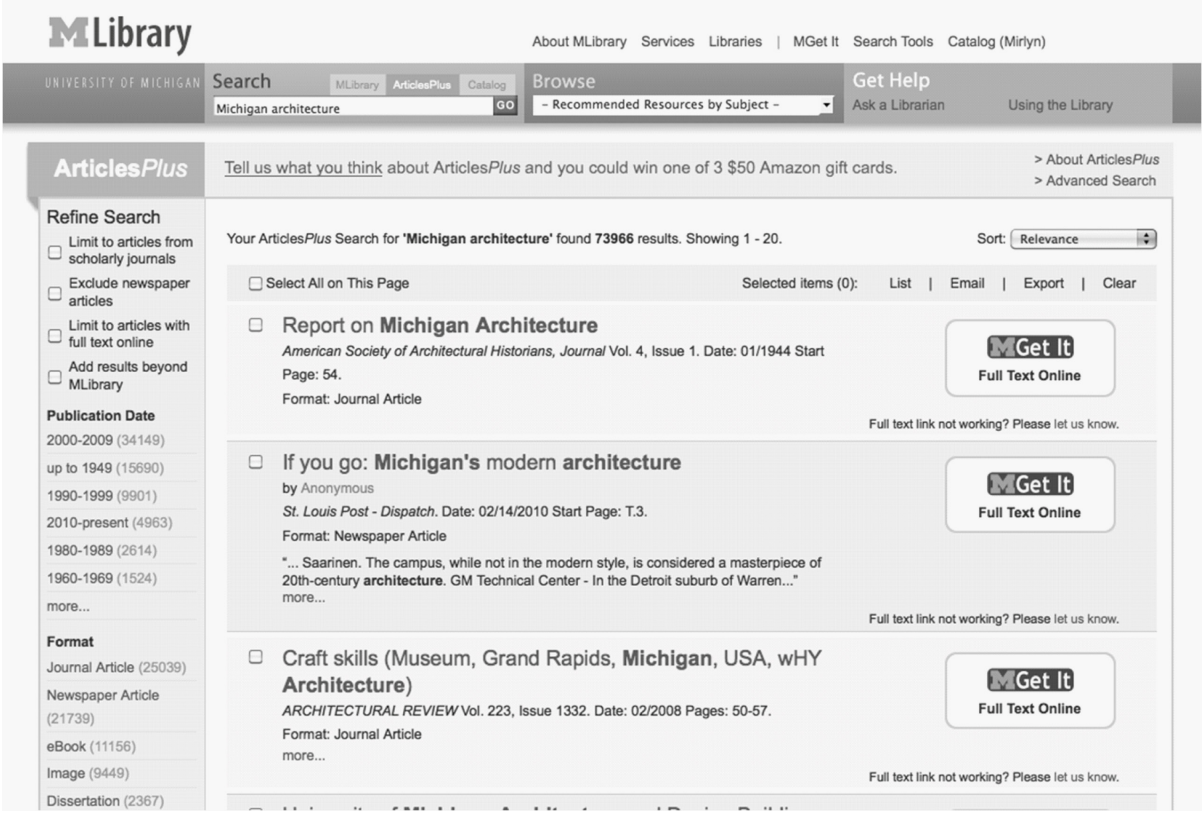


Figure 2. Screenshot of ArticlesPlus interface embedded into library website

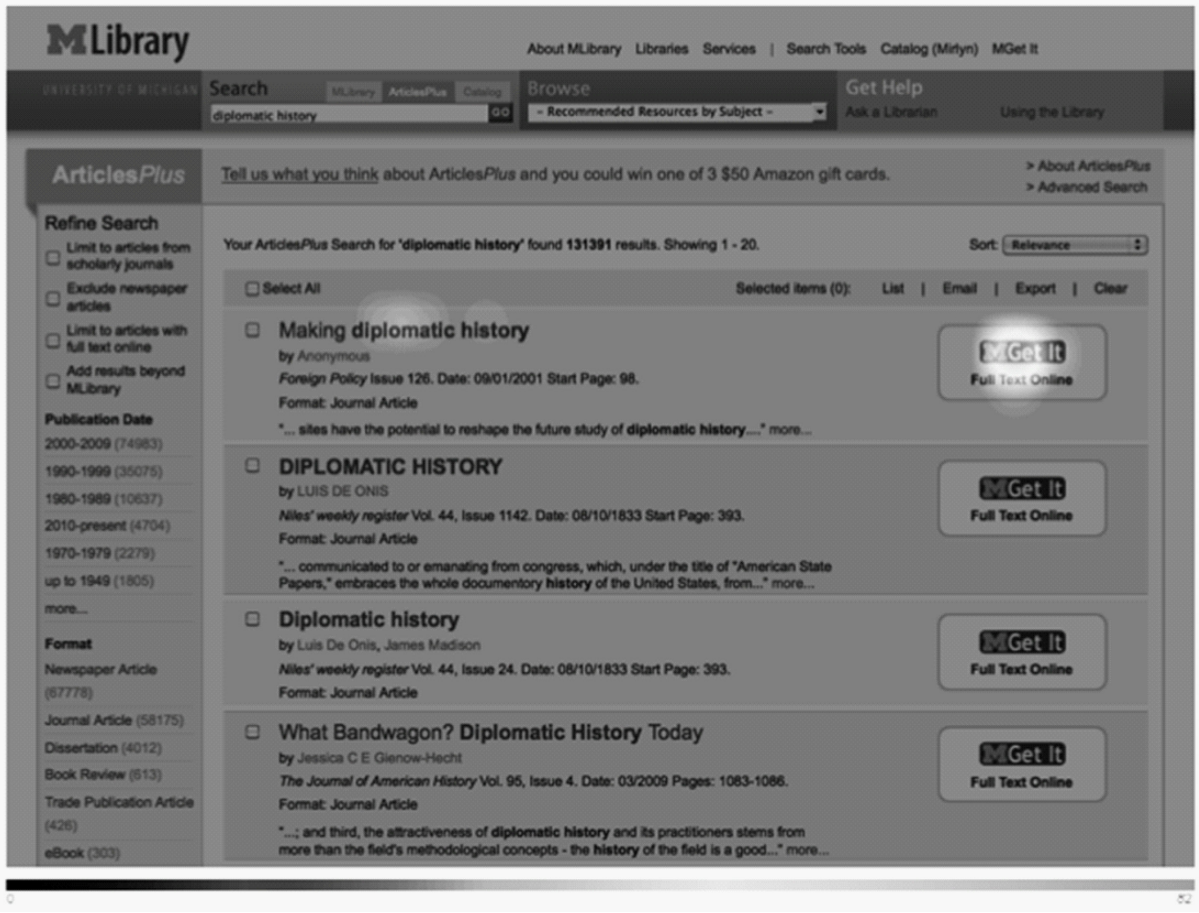


Local Customization

While the Google-like appearance of the Summon™ out-of-the-box user interface was satisfactory, the University Library opted to build its own interface to the article discovery tool using the library's content management system, Drupal. The "Article Discovery" module harnessed the search power of the Summon™ API but presented search results within the context of the library Web site (see Figure 2).[12] The Web site, which had been recently redesigned, already included an article search capability driven by MetaLib®. The previous tool was underutilized (receiving only a few hundred uses per day, compared to several thousand in each of the catalog and the rest of the library's Web content). The Article Discovery module offered the same user functionality yet took advantage of the scope and speed of the Summon™ service. Additionally, keeping the discovery process in the library context allowed the library to brand the resource clearly as a service of the library in a way that would permit migration to a different article discovery service in the future, without requiring re-branding of the service. There was also a desire for a more descriptive name for the tool than "Summon," to better convey its purpose to campus users.

The name that was ultimately selected was "Articles*Plus*," replacing the former MetaLib®-driven "Articles" search tab on the library Web site's banner. This name change reflected the Summon™ service's inclusion of more than articles as well as the anticipated improved performance and functionality.

Figure 3. Sample heat map in response to question, "Where would you click to go directly to this article?"



Launch Survey

When it was launched in late September 2010, Articles*Plus* included a link to a user satisfaction and usability evaluation survey (see Appendix C for the survey instrument). The survey was designed to gather feedback specifically about Articles*Plus*, so it was made available only from a link at the top of the new Articles*Plus* interface (see Figure 2). The survey ran from September 27 to October 31, 2010, resulting in a convenience sample of 194 responses (not all questions were required so some respondents didn't answer every question). On completion of the survey, the respondents were given the opportunity to enter a prize drawing by submitting their contact information via a form that was disconnected from the survey to ensure participant anonymity. Three respondents were selected at random to be the winners of $50 Amazon.com gift certificates. The Qualtrics™[13] survey software was selected for two reasons: first, because it was available at no charge to the Libraries through a campus license; and second, because it allowed both standard survey questions (e.g., demographics, satisfaction ratings) and task-based usability questions that recorded clicks on a screenshot of the interface with the responses compiled and presented as a heat map (see Figure 3 for an example).

It should be noted that in the early days of the survey, problems with linking to the full text of articles via the library's new OpenURL link re-

Table 4. Launch survey questions and success rates (n = 194)

Question	Success rate
Where would you click to start a new search in this page?	91%
Where would you click to get results for items not owned by the University of Michigan Library on this page?	63%
Where would you lick to go directly to this article?	72%
Where would you click to show just items that have full text available?	82%
Where would you click to go to the Advanced Articles*Plus* search page?	94%
Where would you click to find more information about the first item in the list?	91%

solver service (which was launched in conjunction with Articles*Plus*) were identified and mostly resolved. Many of the respondents mentioned these issues as being troublesome and ranked the service accordingly. Even so, results of the survey were very positive. When asked to rate Articles*Plus* on a five-point Likert scale, 79% (178 out of 187) chose either "I liked it" or "I liked it a lot." The remaining respondents chose "It was okay" (16%), "I did not like it" (4%), or "I did not like it one bit!" (1%). When asked if they got the search results they expected, users responded primarily positively: 59 respondents expressed their general satisfaction, 18 reported problems with linking to the articles or frustrations with not getting full-text access to all articles, and 24 expressed a variety of positive and negative reactions to a particular part of the interface. Some example responses:

"Yes. It gave me access to many journals all at once instead of looking in each one individually"

"I got more than expected. It is so much faster and easier to find and access the articles needed. Great!"

"Yes, though I was surprised how many results did not have links to the full text."

"It pulled up several article [sic] that did not have anything to do with the topic I was searching for."

"Holy crap, where has this been all my life?"

For the task-based usability section, users were asked six questions about where they would click to accomplish a stated goal. The questions were designed to assess the success of particular design decisions that had been heavily debated during the implementation process. Most of the questions were designed with a primary target or two in mind, which were used to evaluate "success." However, many of the tasks could still be accomplished via a secondary, possibly less direct, route. The results (summarized in Table 4) confirmed the decisions the Libraries made during the design process. (For the complete Articles*Plus* launch survey report with full-color heat maps, see Chapman, 2011.)

POST-IMPLEMENTATION

Six months after its implementation, library administration wanted to measure, more formally, the effect the Summon™ service has had on users' research habits and their perceptions of the library. To gauge the impact of Summon™ on users' perception of the utility of article discovery through the library's Web site, and in relation to other existing resources with similar functionality, data was collected and analyzed from two sources: another, more detailed Web-based survey of library users, and usage data for some of the library's largest article discovery databases.

Table 5. Six-month follow-up survey[16]

	Articles*Plus* (Summon™)	Google Scholar™	Search Tools Quick Search (MetaLib®)	Other Resources
	n=484	*n*=585	*n*=435	*n*=466
Used First All or Most of the Time	36%	37%	27%	47%
Very or Somewhat Satisfied	74%	75%	56%	85%
Have recommended it to others	41%	62%	22%	26%

Follow-up Survey

The six-month follow-up survey was designed to reveal how users viewed their own experience with online article discovery tools, and how those experiences affected preferences and perceptions for future searches. Users were asked specifically about the new Summon™ service (Articles*Plus*), Google Scholar™, the older MetaLib® federated search service (Search Tools Quick Search), which still remained available until Summer 2011, and any other resources they used to search for articles (which they were asked to name). Questions were included to gauge recentness and frequency of search resource use, satisfaction with quality of search experience, and comparison of resource features, including some open-ended questions designed to elicit more detail about the respondents' experiences with these resources. In the same manner as the launch survey, respondents were recruited with a prize drawing incentive at point-of-use on the library Web site—specifically on the Articles*Plus* (Summon™), Search Tools Quick Search (MetaLib®), and Undergraduate Library Web pages—and by email from subject specialist librarians to faculty and graduate students in academic departments. The survey ran for three weeks in the spring of 2011 and received a total of 773 survey responses from undergraduates (35%), graduate students or post-doctoral fellows (48%), faculty or staff (15%), other university-affiliated persons (2%), and unaffiliated persons (<1%)[24].

Most survey respondents had experience with Google Scholar™ (81%), Summon™ (67%), other article discovery resources (65%), and MetaLib® (61%). Only 1% of respondents reported no experience with any of these tools. Respondents named a total of thirty different other article discovery resources they used; the most frequently named were JSTOR®, PubMed, ProQuest®, PsycINFO®[14], and Web of Science®[15]. To facilitate comparisons, respondents were asked for each tool they used about how often they chose to use that tool first before trying other resources, how they rated the quality of their search experience with the tool on a satisfaction scale, and whether they had recommended it to colleagues and friends. Respondents reported starting their research and ranking their satisfaction with Google Scholar™ and the Summon™ service at comparable rates (see Table 5). However, they recommend Google Scholar™ to others more often than Summon™ by a significant margin (for unknown reasons that warrant further investigation).

Given how rarely users in the current information environment start their research on a library Web site (De Rosa et al., 2011, p.32), it was interesting to note that after only six months, a full 36% of respondents were choosing to start their research with Articles*Plus* all or most of the time, and 41% of respondents had already recommended it to someone else.

To give the library more information about how users interacted with and rated the services,

the follow-up survey gave respondents the opportunity to indicate which service they preferred to use when performing specific tasks, and asked them to write in their own words why they did or didn't recommend resources. Respondents' preferences varied according to the type of task motivating their search process.

When searching for journals, respondents prefer Google Scholar™ and the Summon™ service (Articles*Plus),* followed by the MetaLib® federated search service (Search Tools Quick Search):

"ArticlesPlus is very accurate and often finds obscure journal articles I was not aware of. I enjoy using it immensely, but the ease of Google Scholar™ is often the deciding factor (I use Chrome, so I can just type into the URL bar). All other things being equal though, ArticlesPlus is winning me over."

"Google Scholar™ ranks results according to how many other people used that work in their own work, which is a great way to start weeding through a large search. Search Tools is hard to navigate, sometimes refuses to bring you back to your results list (toggling through individual results instead), you have to know whether what you want would be considered humanities or social sciences (which is often hard! especially for those of us in joint degree programs)."

Three tasks followed the same preference pattern where the Summon™ service (Articles*Plus)* was the top choice, followed by Google Scholar™ and then the MetaLib® federated search service (Search Tools Quick Search):

Getting to full-text view of articles online:

"This service [ArticlesPlus] is amazing. It found every one of 7 or so articles in one search by title and an author, and then correctly led me to a full text version each time, even for law journal articles."

"I find it harder to get full-text versions of articles from Google Scholar™."

Conducting advanced searches:

"Google Scholar™ is nice but too general. ArticlesPlus is a quick way to finding the information I need in the format I need it in. I have found more relevant articles using ArticlesPlus."

Limiting a search to scholarly, peer-reviewed journals:

"I really like the addition of ArticlesPlus to the MLibrary Web site. It really came in handy when writing a research summary when I needed to find scholarly articles."

"ArticlesPlus was recommended because it is so easy and only spits out reliable sources."

But when finding other topics and articles related to the search target, more respondents preferred Google Scholar™ to the Summon™ and MetaLib® services:

"I feel like Google Scholar™ brings up a lot more options when you're not quite sure what you're looking for. So, I usually use Google Scholar™ to see what I might want to look at, and then (because I often do this on my laptop) I login to the library and search with the specific titles I found on Google Scholar™. I'm not happy with this system because it's a lot of effort, but it's also more effective I think."

Perhaps the most compelling evidence the follow-up survey provided that the Summon™ service was meeting—and in some cases even exceeding—our library users' expectations for article discovery came from responses to the final question on the survey, which asked users who had tried Articles*Plus* if their experience using it made them likely to use library online resources again.

Table 6. Usage of four popular article discovery resources before and after Summon™ implementation[19, 20]

	JSTOR®			LexisNexis® Academic			ProQuest®			SciVerse Scopus®		
Winter:	**2010**	**2011**	**Change**	**2010**	**2011**	**Change**	**2010**	**2011**	**Change**	**2010**	**2011**	**Change**
Searches: *Regular:*	122,302	100,699	**- 18%**	73,943	308,478	**+ 317%**	424,738	455,794	**+ 7%**	31,967	34,742	**+ 9%**
Federated:	n/a	n/a	n/a	n/a	n/a	n/a	144,654	77,248	**- 47%**	73,631	39,112	**- 47%**
Sessions: *Regular:*	119,990	130,910	**+ 9%**	70,544	107,538	**+ 52%**	138,402	107,538	**- 22%**	11,940	15,755	**+ 32%**
Federated:	n/a	n/a	n/a	n/a	n/a	n/a	147,453	77,128	**- 48%**	n/a	n/a	n/a
Full-Text Retrievals:	224,305	207,195	**- 8%**	64,626	320,614	**+ 396%**	165,331	175,318	**+ 6%**	n/a	n/a	n/a

More than three-quarters of respondents (76%) either agreed or strongly agreed, and only 4% disagreed. This result confirmed more definitively the trend already apparent in comments users had submitted over the previous six months (separate from any surveys or prize incentives) through the feedback link in the Articles*Plus* interface, three-quarters of which were overwhelmingly positive. One example (a staff favorite):

"I adore ArticlesPlus. If it were a man I would date him. Expand this service any way you can. Thank you!!!"

Usage Analysis

In addition to the analysis of data from the follow-up survey, usage data for selected major article discovery resources from the Winter Terms before and after Summon™ implementation (January – April 2010 and 2011) were analyzed to explore the effect the availability of the Summon™ service might have had on usage of other resources. The winter semesters before and after Articles*Plus* was launched (Winter 2010, Winter 2011) were selected to control for variances in usage caused by the academic calendar. Available usage data was gathered from the MetaLib® federated search engine (Search Tools Quick Search), which remained available after the Libraries implemented the new Summon™ service (Articles*Plus*),[17] and from four of the library's major licensed databases named by users as preferred resources in the follow-up survey:

- JSTOR® – a major source of scholarly full text articles
- LexisNexis® Academic – a major source of popular press full text articles
- ProQuest® – both an index and a full text source, for both popular and scholarly articles
- SciVerse Scopus®[18] – a major index without full text included, and, unlike the other three, a particularly useful resource for researchers in the Health Sciences and Engineering fields

A summary of the available usage data gathered for these four databases appears in Table 6.

The findings of this analysis confirmed that, after the introduction of the Summon™ service, use of the MetaLib® federated search engine decreased significantly (by 47%), as reflected in the identical decreases in federated searches of both ProQuest® and SciVerse Scopus®. At the

same time, regular searches of both databases increased, indicating that the decrease in use via the federated search tool is not attributable to decrease in demand for the databases' content.[21] Additionally, and similarly to what other institutions that have implemented Summon™ have reported (Way, 2010), there was a significant increase in usage of online full text resources. The number of full text articles retrieved from LexisNexis® Academic nearly quadrupled from Winter 2010 to Winter 2011. The increase in retrieval of full text articles from ProQuest® was a less dramatic, but still significant, 6%.[22]

The exception was JSTOR®, which was used less in Winter 2011 than in Winter 2010—direct searches of it declined 18%, while retrieval of full text articles from it declined 8%. This reflects more of a decline of usage of JSTOR® for article discovery than a decline in demand for the full text it contains.[23] As one user said through the "tell us what you think of it" feedback link in the Articles*Plus* interface:

"I LOVE IT. This is so much more straightforward and useful than using JSTOR or Hathi Digital Trust [sic] on their own, and makes it really easy to find what I'm looking for. Thank you so much for implementing this incredibly necessary and useful feature - I hope it sticks around!"

CONCLUSION

By taking a data-driven, user-centered approach at each stage of the development process, from investigation to implementation and beyond, the University of Michigan University Library was able to select and launch a powerful new research tool that its users find valuable, that they recommend to peers, and that increases use of the library's online resources. The findings presented here demonstrate that a tool which combines the power of Web-scale discovery with the high-quality content licensed by university libraries can satisfy academic users of all kinds—faculty, graduate and undergraduate students alike—as much or more than Google Scholar™.

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KEY TERMS AND DEFINITIONS

API: Application Program Interface, a way for one computer application to request and get data back from another in a machine-readable way. APIs allow computers to exchange defined sets of data without exposing the entire database to outside use.

Convenience Sample: A sample that is gathered from an audience at hand without seeking a truly random or representative group of respondents.

Guerrilla Usability: Often called low-budget usability, a quick user interaction involving one or two questions aimed to answer a specific research question. A guerrilla usability test rarely takes more than ten minutes of a participant's time, often less.

OpenURL: A Uniform Resource Locator that encodes the citation for a journal, book, or other item, in a standard way (specified by ANSI/NISO Standard Z39.88) to enable linking to the location of the full text of the item. OpenURLs are parsed by "Link Resolvers" (products like Serials Solutions® 360 Link or Ex Libris™ SFX®) that match a citation with the full text option preferred by a particular library.

Persona: An archetypical user based on an amalgamation of real-world users and traits.

ENDNOTES

1 Serials Solutions is a registered trademark of Serials Solutions

2 Summon is owned by ProQuest LLC

3 Google Books is a trademark of Google, Inc.

4 The University of Michigan University Library's website is publicly available at http://www.lib.umich.edu and its Mirlyn library catalog is at http://mirlyn.lib.umich.edu

5 ExLibris is a trademark of Ex Libris Ltd.

6 MetaLib is a registered trademark of Ex Libris Ltd.

7 Google Scholar is owned by Google, Inc.

8 Several current and former staff at the University of Michigan Libraries in addition to the authors contributed to the research and committee reports on which this article is based, including Judy Ahronheim, Nancy Allee, Gaurav Bhatnagar, Gabriel Duque, Sara Samuel, Mark MacEachern, and Stephanie Teasley. The authors gratefully acknowledge the assistance of these colleagues.

9 For examples, see the "Guerrilla Test Usability Reports" page of the University of Michigan University Library website: http://www.lib.umich.edu/usability-library/usability-reports/Guerrilla%20Test

10 JSTOR is a registered trademark of ITHAKA.

11 ProQuest® is a registered trademark of ProQuest LLC.

12 The Drupal Article Discovery module is available for installation at http://drupal.org/sandbox/bertrama/1119778 and requires a Summon™ API key, Drupal 6, PHP version 5.x, and a copy of the Summon™ API library for PHP to operate. The module provides a configuration page, a search results page, and blocks for displaying a search box and a facet box. The public interface of the University of Michigan's Articles*Plus* service utilizing this module is available at http://www.lib.umich.edu/articlesplus

13 Qualtrics is a trademark of Qualtrics, Inc.

14 PsycINFO is a registered trademark of the American Psychological Association.

15 Web of Science is a registered trademark of Thomson Reuters.

16 The follow-up survey was dynamically constructed: questions about a resource appeared only if respondents indicated they had used it; comparison questions appeared only if respondents indicated they had used more than one resource; and respondents were free to skip questions, and to select more than one resource on comparison questions. Hence the total number of responses varied for each question, and cumulative response percentages for a question may exceed 100%.

17 After considering the findings in the reports on which this article is based, library administration has since decided to terminate the University of Michigan's subscription to the MetaLib® service and rely on the Summon™ service instead to provide broad, interdisciplinary article discovery for University of Michigan library users.

18 SciVerse Scopus is a registered trademark of Elsevier.

19 Percentages in Table 6 are rounded to the nearest whole percentage point. JSTOR® and LexisNexis® Academic do not provide a way to distinguish searches and sessions initiated via a federated search service like MetaLib from those initiated via the database's native interface; hence all searches and sessions from these two databases are counted as regular. SciVerse Scopus® provides a way to distinguish between regular and federated searches, but not sessions, and contains no full text; hence all sessions from it are counted as regular, and direct full text retrievals are not available from it.

20 The increase in the number of JSTOR® sessions while searches and full text retrievals declined is likely caused by changes JSTOR® made between Winter 2010 and Winter 2011 that allow users to link to JSTOR® article citations from results lists in freely acces-

sible search engines like Google Scholar, regardless of whether the users' institutions subscribe to the JSTOR® collections providing the full text of the articles. Thus since late 2010, users in search of the full text of an article found via a search engine may be led into JSTOR®, but not permitted to retrieve the full text of it there; if they give up, or click on an OpenURL link in JSTOR® leading to the full text in another database, they have initiated a JSTOR® session without conducting a search or retrieving any full text from within JSTOR®. In Winter 2011, the University of Michigan did not subscribe to four of the nine available JSTOR® Arts & Sciences multi-disciplinary journals archive collections, so this was a common experience for our users.

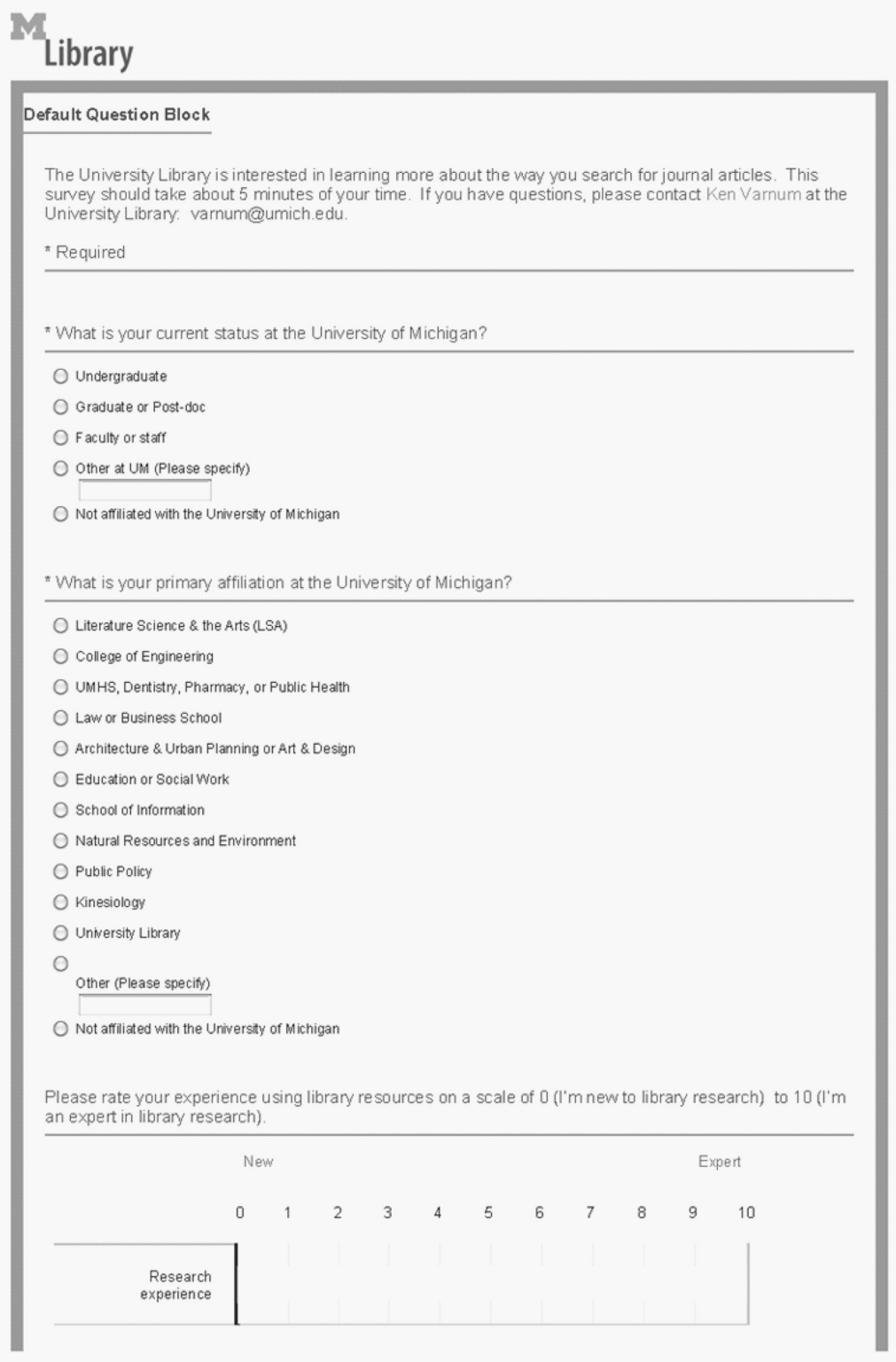
21 The increase in regular searches of SciVerse Scopus® is particularly notable; unlike ProQuest®, it is not itself a source of full text, so none of the increase in its regular use can be attributed to it being merely the target for full text retrieval via an OpenURL link from another discovery tool like Summon™ where most of the user's discovery process actually took place.

22 The difference in magnitude between these increases in full text retrievals is likely caused in part by the different way OpenURL links to full text articles are handled by these databases: OpenURL links to articles in LexisNexis® Academic lead directly to the full text, while in ProQuest® they lead to display of a citation of the article that includes a link to the full text—if after reaching the citation, the user fails to click on the full text link, the article is never retrieved. It is likely that some users clicking on an OpenURL link in the expectation of retrieving full text who arrive at a citation display fail to persist and click a second time to reach the full text. Likewise, the large difference in how regular sessions changed is likely caused at least in part by whether the use of an OpenURL link to reach the full text of an article does (as in LexisNexis® Academic) or does not (as in ProQuest®) register as part of a session. The fact that in ProQuest® regular sessions declined by 22%, while full text retrievals increased, suggests that to a significant extent, use of the Summon™ service displaced use of the native ProQuest® interface to discover articles available in full text in ProQuest® (which were retrieved via OpenURL links leading from Summon™ to the full text in ProQuest®).

23 Because there is considerable overlap between the full text journal back-files available in JSTOR® and the full text journal content available in other databases and publisher packages licensed by the library (such as Periodicals Archive Online, SciVerse ScienceDirect®, SpringerLink, Wiley Online Library, etc.), it is possible that the 8% decline in retrieval of full text articles from JSTOR® represents not any true decline in use of those articles, but only a switch to accessing the full text of them in other databases instead. When using JSTOR® to discover articles, the full text will most likely be retrieved from JSTOR®; but when using the Summon™ service for discovery, the full text for many of the same articles could be retrieved from other databases, especially if the OpenURL link resolver used to link from Summon™ to the full text is configured to prioritize retrieval from other databases above retrieval from JSTOR® (as is done to some extent at University of Michigan).

24 Material in this section is based on, and the survey instrument reproduced as Appendix 3 is drawn from, an unpublished internal study at the University of Michigan Library, Summon™ Benefit Analysis Group Final Report (Allee, Dennis, Teasley, & Varnum, 2011).

APPENDIX A: INITIAL SURVEY



Library

Default Question Block

The University Library is interested in learning more about the way you search for journal articles. This survey should take about 5 minutes of your time. If you have questions, please contact Ken Varnum at the University Library: varnum@umich.edu.

* Required

* What is your current status at the University of Michigan?

- ○ Undergraduate
- ○ Graduate or Post-doc
- ○ Faculty or staff
- ○ Other at UM (Please specify)
- ○ Not affiliated with the University of Michigan

* What is your primary affiliation at the University of Michigan?

- ○ Literature Science & the Arts (LSA)
- ○ College of Engineering
- ○ UMHS, Dentistry, Pharmacy, or Public Health
- ○ Law or Business School
- ○ Architecture & Urban Planning or Art & Design
- ○ Education or Social Work
- ○ School of Information
- ○ Natural Resources and Environment
- ○ Public Policy
- ○ Kinesiology
- ○ University Library
- ○ Other (Please specify)
- ○ Not affiliated with the University of Michigan

Please rate your experience using library resources on a scale of 0 (I'm new to library research) to 10 (I'm an expert in library research).

New Expert

0 1 2 3 4 5 6 7 8 9 10

Research experience

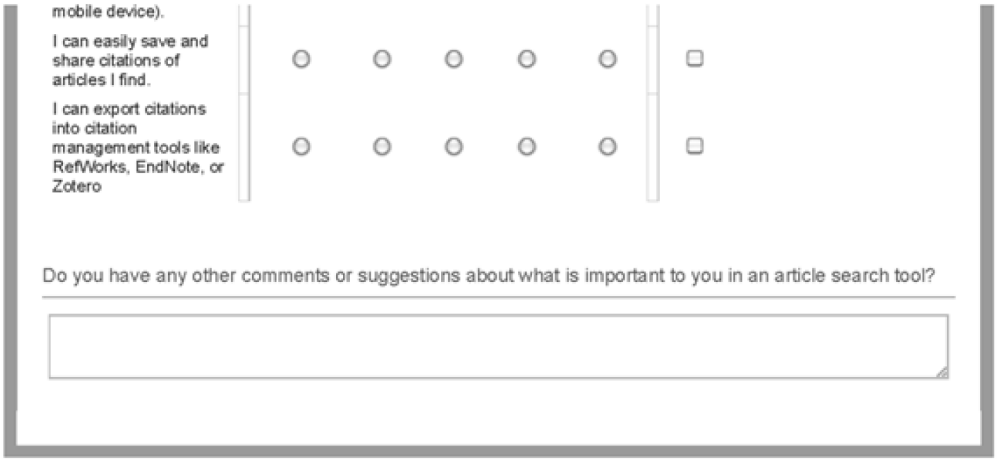
What online resources do you most frequently use to find journal articles?

Imagine you are starting a new research project and need to find journal articles. Rate the importance of the following features for finding articles.

	Not at all important	A little important	Neutral	Important	Very Important	I don't know what this is
I can find articles from the top journals in my subject area.	○	○	○	○	○	☐
I can perform advanced searches (options are available to search in multiple fields at the same time like year, author, title, keyword).	○	○	○	○	○	☐
My search results lists both relevant books and useful journal articles.	○	○	○	○	○	☐
I can limit my search so I only get articles from scholarly (peer-reviewed) journals.	○	○	○	○	○	☐
I can get articles from multiple databases with one search, and know which databases the results are coming from.	○	○	○	○	○	☐
I can easily find other topics and articles related to my original search.	○	○	○	○	○	☐
I can easily narrow down my search results by clicking on different links (such as year or subject).	○	○	○	○	○	☐

Imagine you are looking at a list of search results related to your new research project. Rate the importance of the following features for using your search results.

	Not at all important	A little important	Neutral	Important	Very Important	I don't know what this is
I can get to the full text of an article in one mouse click.	○	○	○	○	○	☐
I can save a search so I can go back and see new items.	○	○	○	○	○	☐
I can use it from my smart phone (or other	○	○	○	○	○	☐


mobile device).
I can easily save and share citations of articles I find.
I can export citations into citation management tools like RefWorks, EndNote, or Zotero
Do you have any other comments or suggestions about what is important to you in an article search tool?

APPENDIX B: GUERRILLA TEST SCRIPT

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Appendix: Interview Script

SOLICITATION

Hi, I'm ____, a librarian here. We're investigating tools to improve searching on our web site. Do you have about ten minutes to give it a test in exchange for 5 Blue Bucks?

No → Thanks anyway

Yes → Great! Please have a seat.

INTRODUCTION

This tool is not available at U-M, but other institutions have added it to their sites. We're going to use the version at Dartmouth College. Please keep in mind that the specific journals and books that Dartmouth College owns may not be the same as those that you would have access to here, if this tool were purchased.

First, some basic questions:

What is your role at the University (i.e., undergrad, grad, researcher, faculty, staff)?

What is your affiliation (school or department)?

I'd like you to think about something you might search the library for (for example, the topic of a recent or current assignment). Now, I'd like you to try that search on this site and look for some materials that might interest you.

Note what they searched:

Take a look at the results and describe to me what you've found.

Let user play around a bit, if they seem inclined. Remind them that they may not be able to reach the full text for some items.

Article Discovery Working Group Supplemental Report

Note what they searched and what they do – do they use or mention the facet? Sort? Did they click any titles? You might have to probe with questions like:

- ***If you were a Dartmouth student/faculty, would all of these items be available to you online?***
- ***What all kinds of items did this find?***

Did you notice the column on the left?

Yes – what did you think about them?

No – What do you think it's for?

Do the results seem useful?

Have you searched for articles before today?

No – ok, thanks

Yes –

a.) Where do you usually search for articles?
If needed, prompt with examples (Search Tools, Google Scholar, ProQuest, PubMed, etc.)

b.) How does this tool compare with the one you usually use?

Any other questions or comments?

WRAP-UP

Thank you for your time. Here are your Blue Bucks.

APPENDIX C: FOLLOW-UP SURVEY

Introduction

Library

The University Library is interested in your feedback on the online tools we offer to help you find articles. Your responses to this survey will help us provide you with quality article discovery resources for research, teaching and learning.

In appreciation of your time and effort, you will be given the option of entering into a drawing for a $50 gift card by providing your name and email address on a separate form at the completion of the survey.

The survey takes approximately 10 minutes to complete. Responses are completely confidential, and there will be no links between survey responses and the gift card form. Please contact article-discovery-survey@umich.edu with any questions or comments about this survey.

Thank you.
Summon Benefit Analysis Working Group
University Library
article-discovery-survey@umich.edu

Demographics

What is your current status at the University of Michigan (UM)?

- ○ Undergraduate
- ○ Graduate or Post-doc
- ○ Faculty
- ○ Staff
- ○ Other at UM (please specify):
- ○ Not affiliated with the University of Michigan

What is your primary affiliation at UM?

- ○ Architecture & Urban Planning
- ○ Art & Design
- ○ Business
- ○ Dentistry
- ○ Education
- ○ Engineering
- ○ Information, School of
- ○ Kinesiology
- ○ Law
- ○ Literature Science & the Arts (LSA)
- ○ Medicine
- ○ Music, Theatre & Dance
- ○ Natural Resources and Environment
- ○ Nursing
- ○ Pharmacy
- ○ Public Health
- ○ Public Policy
- ○ Rackham School of Graduate Studies
- ○ Social Work

- University of Michigan Health System
- University Library
- University of Michigan Dearborn
- University of Michigan Flint
- Other at UM (Please specify)
- Not affiliated with UM

Rate your expertise in using library online resources.

- Expert
- Average
- Novice

Resource Comparison

Which of the following resources have you ever used to search for journal articles? Please select all that apply:

- ☐ ArticlesPlus

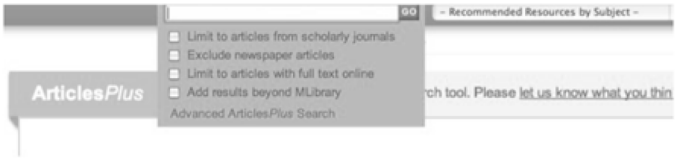
- ☐ Google Scholar

- ☐ Search Tools Quick Search

- ☐ Other (e.g. ProQuest, JSTOR, PubMed, etc.–please specify most frequently used resource):
- ☐ None of these

More about ArticlesPlus

Please answer the following question based on Articles*Plus*. A sample Articles*Plus* screen is shown below:



When was the last time you used ArticlesPlus?

- Today
- This week
- Last week
- This month
- More than a month ago

How often do you use ArticlesPlus first before you try other similar resources?

- All of the time
- Most of the time
- Sometimes
- Rarely
- No longer use

Rate the quality of your search experience using Articles*Plus*.

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied

More about Google Scholar

Please answer the following question based on Google Scholar. A sample Google Scholar screen is shown below:

When was the last time you used Google Scholar?

- Today
- This week
- Last week
- This month
- More than a month ago

How often do you use Google Scholar first before you try other similar resources?

- ○ All of the time
- ○ Most of the time
- ○ Sometimes
- ○ Rarely
- ○ No longer use

Rate the quality of your search experience using Google Scholar.

- ○ Very satisfied
- ○ Somewhat satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Somewhat dissatisfied
- ○ Very dissatisfied

Have you ever noticed the "Availability at Umichigan" links (illustrated below)?

[CITATION] A functional analysis of jaw mechanics in the dinosaur **Triceratops**
JH Ostrom - 1964 - Peabody Museum of Natural History
Cited by 37 - Related articles - Availability at UMichigan - Library Search

- ○ Yes
- ○ No
- ○ Not sure

More about Search Tools Quick Search

Please answer the following question based on Search Tools Quick Search. A sample Search Tools Quick Search screen is shown below:

When was the last time you used Search Tools Quick Search?

- ○ Today
- ○ This week
- ○ Last week
- ○ This month
- ○ More than a month ago

How often do you use Search Tools Quick Search first before you try other similar resources?

- All of the time
- Most of the time
- Sometimes
- Rarely
- No longer use

Rate the quality of your search experience using Search Tools Quick Search.

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied

More about Other Choice

When was the last time you used ${q://QID4/ChoiceTextEntryValue/4}?

- Today
- This week
- Last week
- This month
- More than a month ago

How often do you use ${q://QID4/ChoiceTextEntryValue/4} first before you try other similar resources?

- All of the time
- Most of the time
- Sometimes
- Rarely
- No longer use

Rate the quality of your search experience using ${q://QID4/ChoiceTextEntryValue/4}.

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied

Universal Questions

Some people use multiple resources depending on their search interests and information needs. Based on your experience to date, please indicate which resource you **prefer to use** when answering the following questions. Please select only one in each row.

	ArticlesPlus	Google Scholar	Search Tools Quick Search	I don't do this
Searching for journal articles	☐	☐	☐	☐
Searching for a specific journal citation	☐	☐	☐	☐

Getting to full-text view	☐	☐	☐	☐
Doing advanced searches	☐	☐	☐	☐
Saving search results	☐	☐	☐	☐
Sharing search results	☐	☐	☐	☐
Limiting my search to scholarly, peer-reviewed journals	☐	☐	☐	☐
Finding other topics and articles related to my search	☐	☐	☐	☐
Expecting the search results to match my information need	☐	☐	☐	☐

I have recommended the following resource(s) to colleagues and friends (select all that apply):

- ☐ ArticlesPlus
- ☐ Google Scholar
- ☐ Search Tools Quick Search
- ☐ Other (please specify)

Please tell us why you recommended, or why you didn't, the above resources:

My experience using ArticlesPlus resources makes me likely to use library online resources again (select one):

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

Thank you for completing this survey. If you wish to be entered in the drawing for one of five $50 Amazon.com gift certificates, click the next button below. You will not be entered in the drawing unless you click the next arrows. (Note that only active faculty, staff, researchers, and students at the University of Michigan Ann Arbor campus are eligible to enter and win.)